

Correlations of Specific Ionic Effects using Ion Channels and Surface Charge Measurements

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Specific ionic effects, as captured in the Hofmeister series, have been observed in many biological phenomena including protein folding and aggregation and lipid bilayer interactions. Previously we have shown that the Hofmeister effect is present in the activity of gramicidin A channels. In particular, measurements of channel open lifetime and conductance in potassium salts clearly show the existence of two distinct ionic classes that could be identified as kosmotropic and chaotropic. To further investigate this behavior, we have measured the zeta potential of diphytanoyl phosphatidylcholine (DPhPC) liposomes in salt solutions. We observe that anions alter the surface charge of the liposomes depending on the classification of the anion as kosmotropic or chaotropic. Chaotropic anions (SCN^- , ClO_4^-) decrease the surface charge of the liposomes while kosmotropic anions (Cl^- , H_2PO_4^- , SO_4^{2-}) have the opposite effect. These results correlate with our previous studies of cation conductance through gramicidin A channels adding new insight into ionic interactions at the lipid-water interface.

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